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ABSTRACT

This paper summarizes the results of a study of student achievement and student attitudes toward competency-based curriculum in one high school in the Houston Independent School District. Students were asked to rate instructional modules they completed during one academic year. They were given parts of the California Achievement Test and the Vocational Preference Test (intended to measure personality factors), in addition to the Module Opinionnaire. The findings indicate that competency-based education's compensatory potential is not inherently limited by requirements that students have high reading skills or certain other characteristics. Student ratings of modules on factors labeled "difficult," "useful," and "dull" are but little related to academic skills or personal characteristics of high school students. (Author/DS)

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THE COMPENSATORY POTENTIAL OF COMPETENCY-BASED EDUCATION

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THE COMPENSATORY POTENTIAL OF COMPETENCY-BASED EDUCATION

Among the comments about competency-based education collected by Schmieder (13) is the comment that "It sounds like a good idea if you can figure out what it is." For the purposes of this paper, competency-based education (CBE) will be defined thusly:

> First, competency-based education implies that all instructional goals and their assessment criteria will be publicly stated in precise behavioral terms. Second, competency-based education requires that, while the student is to accept responsibility for meeting all the objectives of instruction, the student is to accept commensurate freedom to himself decide the pace, sequence, and manner in which he will pursue these objectives. (15)

Though some (18) have already sounded a death knell for this relatively new movement, others (8:5) long ago noted that implementation of competency-based programs has expanded to public elementary and secondary schools. More recently, Spady (14:9) reports that over twenty states are currently "considering or implementing a range of 'CBE' schemes for their elementary or secondary schools."

In some cases the implementation of CBE models in public schools can be related to the compensatory potential claimed for competency-based education. CBE advocates claim this potential for two reasons. First, it is argued that CBE has compensatory potential because the approach, by focusing on exit requirements

rather than entrance requirements, recognizes a student right to enter classes, and to do so without the stigma normally created by a history of previous academic failure. Cooper and Weber (3:16-17) put it this way:

> Traditional programs heavily emphasize program entrance requirements, while competency-based programs emphasize exit requirements. A competency-based approach seems to be particularly advantageous to those who have been denied equal educational opportunity and, because of the usual entrance requirements, might not otherwise be given a chance.

Second, it is argued that CBE has compensatory potential because the approach allows students to learn at their own rates, and also because the approach recognizes a student's right to fail. According to Hall and Jones (7:8-9),

> CBE includes provisions to ensure that at least minimal achievement is reached by all students. . . . Student achievement is not evaluated by group comparisons on a normal curve . . . . The problem with the normal curve is that, by definition, someone has to fail. CBE attempts to reduce the failure syndrome . . . .

But critics of CBE argue that for two reasons, the supposed compensatory potential of competency-based education is illusory. First, the critics say, in practice most CBE programs use written modules as the primary mode of instruction. Thus, students deficient in reading skills may feel more frustrated than aided by CBE programs. The critics of CBE argue secondly that the students who most need compensatory help may also lack the self-discipline required by an approach which emphasizes self-pacing. Indeed, if the report of one

former CBE student is to be believed, this CBE requirement for self-discipline is focal. (16:343-44)

> At times being in a CBE program is like being in the middle of a desert. You have been told how many steps it will take you to reach the oasis. But you don't know until you take the steps how difficult each step will be. Some steps are short but you find yourself mired in sand drifts as you take them. As you make your way toward the oasis, it is often tempting to give up. Perseverance is a prerequisite for completion of a CBE program.

The purpose of this study was to help determine which of the countervailing perceptions of CBE is valid. Specifically, the study addressed two questions. How, if at all, are the academic skills of students related to students' attitudes toward CBE modules? And how, if at all, are student characteristics (including those of self-control) related to students' attitudes toward CBE modules?

METHODOLOGY

Subjects

In order to answer these questions, all students enrolled in a Houston Independent School District high school were asked to rate all the instructional modules they completed during one academic year. These modules covered the core subjects of English, Science, and Social Studies. The school's curriculum is wholly competency based.

During the 1975-76 school year, the period when this study was conducted, the school was in the process of doubling its enrollment. At the beginning of the year about 125 students

were enrolled. By the end of the school year approximately 300 students were enrolled. The school's program might be considered compensatory, since the school admits only students with motivation problems, as evidenced by a history of low achievement, poor attendance, or discipline difficulties.

Instrumentation

Three instruments were used in the study reported here. The instruments were the Module Opinionnaire, the California Achievement Test, and the Vocational Preference Inventory (VPI). The Module Opinionnaire requires students to rate, on a 1-5 scale, the extent to which each of 12 adjectives describes each completed module. The adjectives were selected by the school's faculty as markers of the basic parameters of "good" curriculum materials.

The California Achievement Test is a widely used standardized achievement test. The test was selected for use in this study because the test was not used in regular HISD testing programs. The students were off-level tested one level below actual grade place with the level 4, Form A, California Achievement Test. The students were off-level tested to obtain more reliable measurement of widely variant student achievement levels.

Students completed only four of the seven subtests of the California Achievement Test. Students completed all subtests (vocabulary and comprehension) in the reading area, and all subtests (computation and concepts-problem solving) in the

mathematics area. Reported reliabilities for these subtests are .918, .894, .926, and .915, respectively. Students were not asked to complete the mechanics, usage and structure, or spelling subtests of the third test area, language usage. It was felt that this test area dealt more with student aptitude in applying specific rules of grammar, as opposed to more generalized academic abilities.

The Vocational Preference Inventory consists of 160 occupational titles. Respondents indicate whether or not they would like to be engaged in each of the occupations listed. The test yields 11 subtest scores. The six subtests related to vocational interests are labeled realistic, intellectual, social, conventional, enterprising, and artistic. Five additional subtests are considered to be personality scales; these have been labeled self-control, masculinity, status, infrequency, and acquiescence.

The VPI was selected for use in this study because the instrument's seemingly neutral content reduces faking. Perhaps this is why one reviewer (5:115) characterized the VPI as being "an ingenious approach to personality measurement." It previously had been considered appropriate to use the VPI only with college level persons, but a recent study (4) using the subjects of the investigation reported here demonstrated a high correspondence between the way the VPI performs with college and high school students.

Data Analysis

Each student's Module Opinionnaire ratings were averaged. This was done to reduce variance associated with date of enrollment in the expanding school, and to avoid giving students who finished more modules than their colleagues undue influence in determining analytic solutions. The resultant means of each student's ratings were then analyzed using a principal components procedure. All components (hereafter called factors) with Eigenvalues ≥ 1.00 (6) were extracted from the variable by variable correlation matrix. The three factors thus extracted were then rotated to the varimax criterion (9). Factor pattern coefficients produced by this procedure are presented in Table 1. Each factor was named after its highest loading item. Alpha factor analysis yielded Cronbach generalizability coefficients for three related factors of .926, .793, and .449, respectively. Least square regression estimates of factor scores (17) were calculated.

These factor scores were then used as one variable set in a canonical analysis. The other variable set in the analysis consisted of the students' four CAT subtest grade equivalent scores in zed score form. This procedure generated only one significant canonical variate. The canonical correlation between the two variable sets was .261 ($\chi^2(12) = 22.076$, $p < .05$). The variate coefficients this procedure produced are presented in Table 2.

TABLE 1

VARIMAN ROTATED FACTOR PATTERN COEFFICIENTS (N=261)

ITEM	FACTOR			
	DIFFICULT	USEFUL	DULL	h^2
Helpful	-.048	.751	-.171	.595
Interesting	-.018	.332	-.718	.626
Valuable	.051	.735	-.187	578
Dull	.150	-.275	.806	.748
Boring	.251	-.250	.747	.683
Difficult	.886	-.116	.077	.804
Tough	.847	-.123	-.017	.732
Exciting	.087	-.038	-.726	.537
Hard	.806	-.026	.122	.666
Useful	.009	.820	-.039	.673
Easy	-.699	-.113	-.049	.504
Worthless	.195	-.631	.337	.550
% Factor Var. (Sum = 100)	36.1	32.0	31.9	
% Total Var. (Sum = 64.1)	23.1	20.5	20.5	

TABLE 2

CANONICAL VARIATE COEFFICIENTS (N=261)

VARIABLE	COEFFICIENT	VARIABLE	COEFFICIENT
Reading Vocabulary	.644	Difficult	.673
Reading Comprehension	.904	Useful	-.387
Math Computation	.119	Dull	-.631
Math Concepts & Problem Solving	-.862		

A second series of canonical analyses using VPI data was performed. Unfortunately VPI data were not obtainable from all students. This necessitated refactoring of Module Opinionnaire data generated by students for whom VPI data were available. The factor pattern coefficients produced by this second analysis procedure are presented in Table 3.

Kaiser et al. (10) have suggested that the correspondence of a set of constructs evidenced in different groups can be estimated by examining the cosines of the test vectors of the groups' constructs. To determine if the Module Opinionnaire measured essentially the same factors in both the larger and the reduced size samples, these cosines were calculated. The cosines are reported in Table 4. The factors were essentially the same for both sample groups.

TABLE 3

VARIMAX ROTATED FACTOR PATTERN COEFFICIENTS (N=176)

ITEM	FACTOR			
	DIFFICULT	USEFUL	DULL	h^2
Helpful	.017	.776	-.121	.616
Interesting	-.063	.407	-.598	.527
Valuable	-.014	.715	-.220	.560
Dull	.135	-.389	.712	.677
Boring	.282	-.368	.695	.698
Difficult	.876	-.144	.039	.790
Tough	.852	-.213	-.105	.783
Exciting	.043	-.077	-.748	.567
Hard	.783	.068	.268	.689
Useful	.029	.793	-.029	.630
Easy	-.721	-.111	-.100	.543
Worthless	.218	-.668	.288	.577
% Factor VAR. (Sum = 100)	36.3	35.6	28.0	
% Tota' VAR. (Sum = 63.8)	23.2	22.7	17.9	

TABLE 4

COSINES AMONG FACTOR AXES

FACTOR (N = 261)	FACTOR (N = 176)		
	DIFFICULT	USEFUL	DULL
Difficult	.999	-.006	-.011
Useful	.007	.997	.068
Dull	.011	-.068	.997

Because relatively few persons completed both the Module Opinionnaire and the VPI, two separate canonical analyses of these data were performed. The first analysis involved VPI vocational subtests in zed score form and Module Opinionnaire factor scores as variable sets; the second analysis involved VPI personality subtests in zed score form and Module Opinionnaire factor scores as variable sets. There was no significant canonical correlation between the variable sets in either of the two canonical analysis.

INTERPRETATION AND CONCLUSIONS

The results of the first canonical analysis suggest that general academic ability is somewhat related to attitudes toward competency-based curriculum materials. However, only 6.8% of the variance in the attitude variables could be explained by variance in the achievement variables.

As might be expected, reading comprehension and math concept and problem-solving skills both loaded high on a variate on which the attitudes of "difficult" and "dull" also loaded high. There may be two reasons why reading achievement is related to attitudes toward CBE modules. First, reading skill is a measure of ability to learn if the instructional method emphasizes reading. Second, past reading achievement may be a measure of general inclination to endure hardships (like difficulty and dullness) to reach learning goals.

Perhaps math concept and problem-solving skill is related to attitudes toward modules to the extent that the skill reflects a cognitive style orientation. Of course, the math concept and problem-solving subtest may be considered another measure of inclination to endure learning hardships.

Taking the directionality of variate coefficients into account, the one significant canonical variate might be interpreted as a method vs. content variate. The method end of the variate continuum includes characteristics of reading achievement and the attitude factor "difficult." The content end of the continuum includes characteristics of the attitude dimension "dull" and math concept and problem-solving skill.

Apparently, academic ability is not highly associated with student judgment of how "useful" particular CBE modules are. The results of the second two canonical analyses suggest that several student characteristics are also not substantially related to attitudes toward CBE curriculum materials.

These findings do not demonstrate that CBE has compensatory impacts. These impacts are discussed elsewhere in the project"s evaluation reports. Nor to these findings demonstrate that high school students will perceive all CBE curriculum materials independent of the students' academic abilities or other characteristics. Whether academic ability and other student characteristics are associated with student attitudes toward CBE curriculum is probably determined by the manner in which specific programs are implemented.

But the findings do demonstrate that, even in a school composed exclusively of students with histories of academic, attendance or discipline problems, general academic skills are related, but not too highly related, to ratings of competency-based education curriculum materials. Perhaps this is because CBE implies allowing students to select alternative learning activities, and students are able to select reading materials which do not frustrate them. Certain other student characteristics, including vocation and personality related measures, are not significantly related to attitudes toward CBE modules. Thus, to the extent that student attitudes affect student achievement (1, 2, 11, 12), it can be argued that CBE can have compensatory potential for high school students, regardless of their general academic skills or certain other variables.

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